

## **BAA-AFOSR 2011-06**

### **BROAD AGENCY ANNOUNCEMENT (BAA) UNIVERSITY CENTER OF EXCELLENCE: HIGH-RATE DEFORMATION PHYSICS OF HETEROGENEOUS MATERIALS**

#### **OVERVIEW INFORMATION**

The Air Force Office of Scientific Research (AFOSR) manages the basic research investment for the U.S. Air Force (USAF). As a part of the Air Force Research Laboratory (AFRL), AFOSR's technical experts foster and fund research within the Air Force Research Laboratory, universities, and industry laboratories to ensure the transition of research results to support USAF needs.

This is a special BAA in support of the AFRL's University Center of Excellence for High-Rate Deformation Physics of Heterogeneous Materials. In collaboration with AFRL Munitions Directorate (Eglin AFB, FL), AFOSR invites proposals for research in the areas described in detail in Section I, Funding Opportunity Description. The schedule for this announcement is given below.

AFOSR will not issue paper copies of this announcement. AFOSR reserves the right to select and fund for award all, some, or none of the proposals in response to this announcement. AFOSR provides no funding for direct reimbursement of proposal development costs. Technical and costs proposals, or any other material, submitted in response to this BAA will not be returned. It is our policy to treat all proposals as sensitive competitive information and to disclose their contents only for the purposes of evaluation.

**1. Federal Agency Name:**

Air Force Office of Scientific Research  
875 North Randolph Street, Suite 325, Room 3112, Arlington VA 22203-1768

**2. Funding Opportunity Title:**

University Center of Excellence for High-Rate Deformation Physics of Heterogeneous Materials

**3. Announcement Type:**

Broad Agency Announcement (BAA) - This is the initial announcement

**4. Funding Opportunity Number:**

BAA-AFOSR 2011-06

**5. Catalog of Federal Domestic Assistance (CFDA) Numbers**

12.800

**• Dates:**

- White Papers (encouraged )no later than 30June 2011
- The proposal must be received in this office no later than 3:00 PM EST, 31 August 2011

- Selection
- Research start date (estimated)

15 October 2011  
1 January 2012

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### I. Funding Opportunity Description

This is a special BAA in support of the AFRL's University Center of Excellence for High-Rate Deformation Physics of Heterogeneous Materials. In collaboration with AFRL Munitions Directorate (Eglin AFB, FL), AFOSR invites proposals for research in the areas described in detail below. The schedule for this announcement is given in Section II, Award Information.

This research effort will consist of interdisciplinary teams of researchers with the skills needed to address the relevant research challenges necessary to meet the program goals. Multi investigator teaming is encouraged but not required. It is expected that proposals will describe cutting-edge efforts on basic scientific problems.

The duration of the proposed effort will be a 3-year base period with two 2-year option periods to bring the total maximum term of the award to seven years. Single award is anticipated. The amount of resources made available to this BAA will depend on the quality of proposals received and the availability of funds, but probably will not exceed \$1,000,000/year. Proposers are highly encouraged to confer with the designated points of contact as soon as possible. Their contact information can be found at the end of this section. White Papers briefly summarizing your ideas and why they are different from what others are doing are highly encouraged, but not required. Coordination with the Air Force Research Laboratory is encouraged but not required.

#### a. University Center of Excellence: High-Rate Deformation Physics of Heterogeneous Materials

**Background:** Over the past several decades the materials community dealing with low to moderate strain rate applications has successfully transitioned from the use of monolithic structural materials to the use of heterogeneous materials, such as metals with textures and reinforced composites. Central to this transition was the introduction of new scientific and engineering thought processes that incorporate contributions from individual material components and their coupled contributions due to the interactions between grains, fibers, matrices, etc. As a result, strengths of individual components were leveraged and failure was

minimized by reducing component cross sections. To explain the transformation of physical properties, isotropic material models were traded for directionally-dependent models which greatly expanded the material property options and applications. Universities led the way and were instrumental to this transition by: (a) identifying the critical mechanisms of material transformation, (b) formulating theoretical and numerical models for simulation of material behavior, (c) developing new diagnostic tools and methodologies for the measurement of material properties, (d) identifying key trends and limiting conditions for materials design, and then (e) using all of these findings to teach a new generation of material scientists and engineers and lead them to think in the way that heterogeneous materials behave.

The current challenge concerning the use of heterogeneous materials for high strain rate applications ( $10^5$ - $10^7$  1/s) appears to be of similar nature but faces much more arduous path than the one endured by the materials community dealing with low to moderate strain rate applications. In fact, scientists and engineers at the Air Force Research Laboratory are researching, developing and applying state-of-the-art (SOTA) and next-generation materials to solve various mission needs for high strain rate applications, particularly with colliding foreign objects. Far-term missions are typically framed by the need for these objects to survive and function: (a) in hypervelocity carriage and target engagement scenarios; (b) impact with much stronger, tougher, and harder target materials; (c) with multiple energy effect options (in terms of both total energy output and effect type); (d) in miniature forms; (e) in extreme storage and handling conditions; and (f) with reduced total life-cycle costs. It is perceived that heterogeneous materials will play a critical role in all aspects of future design of colliding objects in view of (i) the spectrum of material properties that are available (including novel material properties uniquely associated with various heterogeneous materials), (ii) the broad-based suite of roles currently filled by heterogeneous materials, and (iii) the convergence of exceptional experimental and theoretical research capabilities required to thoroughly explore this relatively new materials realm.

Within this context, it is highly desirable to establish a Center of Excellence that will begin studying physical behavior of colliding objects composed of heterogeneous materials under high-pressure, high-strain-rate loading. Traditionally this research area has been called “shock physics” and great care was taken to conduct 1-D experiments to measure the bulk, averaged material behavior. However, the advent of line VISAR (Velocity Interferometer System for Any Reflector) or ORVIS (Optically-Resolved VISAR) has shown that heterogeneous materials interact with shock waves and local material behavior can deviate substantially from the averaged response. A wide variety of mechanisms, which are responsible for producing this “material uncertainty” (vice measurement uncertainty), must be modeled, measured and understood such that the resulting performance provides expanded options for material property set and enable a broader class of high-rate engineering applications. Examples of future heterogeneous materials include: super-hard/super-tough structural materials, geo-materials, energetic/reactive materials, survivable electronics (especially packaging and potting materials), multi-function/multi-role materials, and the integration of such materials into high-efficiency system architectures enabled by heterogeneous materials, etc.

Also, the primary output of this Center of Excellence will be scientists and engineers which have been purposely taught to be well versed to a full spectrum of high-pressure, high-strain-rate physics for heterogeneous materials, including material interfaces, component geometries, relative material properties, phase changes, melting, etc. This educational approach must include theoretical and experimental training with special attention paid to the mathematical foundation

and specialization required to describe and express statistically-distributed, length/time-scale dependence of material behavior when the gage lengths are on the order of the material components (i.e. at the meso-scale). Continuum thinking has dominated the shock physics field since its inception and most practitioners are still trained in classical continuum methods. However, the contemporary SOTA problems demand a different skill set and a fundamental reconsideration of how such students should be taught.

**Objective:** (a) To establish the University Center of Excellence to support DoD-focused research and education needs in modeling, measuring and understanding the “high-pressure, high-strain-rate” physics of heterogeneous materials (i.e. typified classically by precision-impact or pressure-shear impact loading at rates up to kilometers per second and/or extremely rapid rates of energy deposition), (b) to identify and better understand new basic research concepts involving the design of “next generation” heterogeneous materials with novel properties and the applications they enable and (c) to benchmark and lay a solid mathematical foundation for the next generation of heterogeneous material practitioners. It is expected that the objectives will be accomplished via the intentional convergence of pertinent experimental, mathematical, numerical and theoretical capabilities.

**Research Concentration Areas:** Research should be concentrated in the combined spectrum of theoretical, numerical, mathematical and experimental techniques for heterogeneous materials. Attention should be given to the general classes of mechanisms pertinent to high-pressure, high-strain-rate response of heterogeneous materials including: material interfaces, component geometries, relative material properties, phase changes, melting, etc. The research can include the interaction of heterogeneous materials with boundaries such that the materials can be combined into larger system assemblies. Teaming should be encouraged among the researchers and students and with other relevant research and development efforts at the university or AFRL (AFRL encourages summer projects that provide exposure of researchers to AFRL research facilities and ensuing technical exchanges).

It is not required to address specific materials of DoD or Air Force interest, but rather to select materials that are the most instructive teaching tools for the various mechanisms that typify and dominate the response of heterogeneous materials. It is desired to implement a generalized modeling program for heterogeneous materials such that the theory, numerical simulation and experimental approaches lead to the development of high-fidelity (statistically-distributed, length/time-scale-dependent) material models and then to the selection/tailoring of optimum properties for various applications. Proposals are expected to describe the baseline instructional program with attention paid to deviations of this educational approach from the classical continuum shock physics based approach.

Numerical simulation and experimental facilities/capabilities should be noted in detail in the proposal. The simulation description must incorporate a clear recognition of the multi-scale (micro-, meso- and macro-scales) problem and indicate the nature of the solution based on global approach. Specific codes should be noted at the various scales and special attention paid to the handling of material uncertainty and statistically-distributed material models. Moderate and high strain rate experimental facilities should be available to the team for meso-scale measurement of material behavior and validation of theoretical and simulation results at each appropriate length scale. These include specialized heterogeneous material diagnostics that provide insight into the highly-opaque

materials. For example, recent advances in neutron, proton, and X-ray radiography allow the measurement of 3-D meso-scale structure and grain-level stresses.

**Impact:** New classes of heterogeneous materials developed for high-pressure, high-strain-rate applications will be the cornerstone for survival and function of munitions systems in the most difficult and challenging scenarios of storage, carriage, flight and engagement. Their success will lead to not only revolutionary breakthrough of enhanced capability but also result in greater operational flexibility. Education and training of a new generation of researchers able to clearly think in the way that heterogeneous materials behave are expected to conceive new solutions to most difficult contemporary research problems associated with high-strain-rate response. It is envisioned that over the next several decades, the participants of the proposed University Center of Excellence will become leaders of the research and development of new classes of heterogeneous materials and material systems.

AFOSR Program Manager:

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AFRL Lab Point of Contact:

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## II. Award Information

AFOSR encourages the sharing and transfer of technology and welcomes proposals that envision cooperation among two or more partners from academia, industry, and Air Force organizations. The anticipated types of awards are project grants, cooperative agreements, or contracts.

The amount of resources made available to this BAA will depend on the quality of proposals received and the availability of funds, but probably will not exceed \$1,000,000/year. The duration of the proposed effort will be a 3-year base period with two 2-year option periods to bring the total maximum term of the award to seven years. It is expected that each research effort will consist of an interdisciplinary team with the skills needed to address all of the relevant research challenges necessary to meet the program goals. Multi-university teaming is encouraged.

The following additional items should also be considered prior to submission of a full proposal.

- *White Papers:* Submission of a brief white paper (1-2 pages) describing the potential research effort is highly encouraged prior to proposal submission. White papers will be reviewed by AFRL researchers familiar with the AF research interests in this area. Copies of publications or student theses will not be considered as white papers. The

proposers are still free to submit complete proposals even if the initial recommendation suggests that their approaches are not encouraged.

- *AFRL Lab Points-of-Contact (POC)*: Each successful principal investigator awarded funding under this BAA will be expected to develop and conduct a regular dialogue with an AFRL Lab POC who is familiar with the AF research interests in this area.

The anticipated schedule for awards is as follows:

- White Papers (encouraged )no later than 30 June 2011
- The proposal must be received in this office no later than 3:00 PM EST, 31 August 2011
- Selection 15 October 2011
- Research start date (estimated)1 January 2012

Any proposal received at the Government office designated in the BAA after the exact time specified for receipt of offers is "late" and will not be considered unless it is received before award is made, and the Contracting/Grants Officer determines that accepting the late offer would not unduly delay the award, and

(1) If it was transmitted through an electronic commerce method authorized by the solicitation, it was received at the initial point of entry to the Government infrastructure not later than 5:00 p.m. one working day prior to the date specified for receipt of proposals; or

(2) There is acceptable evidence to establish that it was received at the Government installation designated for receipt of offers and was under the Government's control prior to the time set for receipt of offers; or

(3) It is the only proposal received.

The names, phone numbers, and e-mail addresses of the Topic Authors are listed within each solicitation topic above.

### **III. Eligibility Information**

All responsible, potential applicants from academia and industry are eligible to submit proposals. AFOSR particularly encourages proposals from small businesses, historically black colleges and universities, minority institutions and minority researchers. However, no portion of this BAA is set aside for a specific group. Cost sharing is encouraged but not required.

### **IV. Application and Submission Information**

**1. Address to Request Announcement Package** – This announcement may be accessed from the Internet at the Grants.gov web site (<http://www.grants.gov>). See 'For Electronic Submission' below.

**2. Marking of Proposals** - AFOSR is seeking white papers and proposals that do not contain proprietary information. If proprietary information is submitted, AFOSR will make every effort to protect the confidentiality of the proposal and any evaluations. However, under the Freedom of Information Act (FOIA) requirements, such information (or portions thereof) may potentially be subject to release.

**It is the offerors responsibility to notify AFOSR of proposals containing proprietary information and to identify the relevant portions of their proposals that require protection. The entire proposal (or portions thereof) without protective markings or otherwise identified as requiring protection will be considered to be furnished voluntarily to AFOSR without restriction and will be treated as such for all purposes.** If protection is desired for proprietary or confidential information, the proposer must mark the proposal with a protective legend as follows:

(1) Mark the title page with the following legend:

This proposal includes data that shall not be disclosed outside the Government (to include Non-government evaluators and support contractors retained by AFOSR) and shall not be duplicated, used, or disclosed -- in whole or in part -- for any purpose other than to evaluate this proposal. If, however, a contract is awarded to this offeror as a result of -- or in connection with -- the submission of this data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the resulting contract. This restriction does not limit the Government's right to use information contained in this data if it is obtained from another source without restriction. The data subject to this restriction are contained in sheets [*insert numbers or other identification of sheets*]; and

(2) Mark each sheet of data it wishes to restrict with the following legend:

Use or disclosure of data contained on this sheet is subject to the restriction on the title page of this proposal

### **3. Content and Form of Application Submission**

**a. White Paper.** Before submitting a research proposal, you may wish to further explore proposal opportunities. You can do this by contacting the appropriate AFOSR program manager who can provide greater detail about a particular opportunity; the program manager may then ask for a preliminary proposal or white paper. However, in your conversations with a Government official, be aware that only warranted contracting and grants officers are authorized to commit the Government.

If you prefer, or the program manager requests, you may submit a preliminary proposal (White Paper), which should briefly describe the proposed research project's (1) objective, (2) general approach, and (3) impact of Department of Defense (DoD) and civilian technology. The white paper may also contain any unique capabilities or experience you may have (e.g., collaborative

research activities involving Air Force, DoD, or other Federal laboratory.) The Program Manager may have additional guidelines regarding form and content of preliminary proposals.

### **White Paper Format**

- Paper Size – 8.5 x 11 inch paper
- Margins – 1 inch
- Spacing – single or double spaced
- Font – Times New Roman, 10 or 12 point
- Copies – as discussed with the Program Manager
- Content – as described above

**b. Full Proposals.** The proposal may be submitted either electronically or in hard copy form, but not both. All proposers must include the SF 424 (R&R) form as the cover page. Unnecessarily elaborate brochures, reprints or presentations beyond those sufficient to present a complete and effective proposal are not desired. To convert attachments into PDF format, Grants.gov provides a list of PDF file converters at [http://www.grants.gov/help/download\\_software.jsp](http://www.grants.gov/help/download_software.jsp)

### **Full Proposal Format**

- Paper Size – 8.5 x 11 inch paper
- Margins – 1 inch
- Spacing – single or double spaced
- Font – Times New Roman, 10 or 12 point
- Page Limitation – None, although unnecessarily elaborate proposals are not desirable.
- Attachments – submit in PDF format (Adobe Portable Document Format)
- Copies for hardcopy submissions – (one original, number of copies as discussed with the Program Manager)
- Content – as described below

**(1) Advance Preparation For Electronic Submission** - Electronic proposals must be submitted through Grants.gov. There are several one-time actions your organization must have completed before it will be able to submit applications through Grants.gov. Well before the submission deadline, you should verify that the persons authorized to submit proposals for your organization have completed those actions. If not, it may take them up to 21 days to complete the actions before they will be able to submit applications.

The process your organization must complete includes obtaining a Dun and Bradstreet Data Universal Numbering System (DUNS) number, registering with the Central Contract Registry (CCR), registering with the credential provider, and registering with Grants.gov. (Designating an E-Business Point of Contact (EBiz POC) and obtaining a special password called MPIN are important steps in the CCR registration process.) Go to [http://www.grants.gov/applicants/get\\_registered.jsp](http://www.grants.gov/applicants/get_registered.jsp). Use the Grants.gov Organization Registration Checklist at <http://www.grants.gov/section3/OrganizationRegCheck.pdf> to guide you through the process. To submit a proposal to through Grants.gov, applicants will need to download Adobe Reader. This small, free program will allow you to access, complete, and

submit applications electronically and securely. To download a free version of the software, visit the following web site: [http://www.grants.gov/help/download\\_software.jsp](http://www.grants.gov/help/download_software.jsp). Consult Grants.gov to ensure you have the required version of Adobe Reader installed. Should you have questions relating to the registration process, system requirements, how an application form works, the submittal process or Adobe Reader forms, call Grants.gov at 1-800-518-4726 or [support@Grants.gov](mailto:support@Grants.gov) for updated information.

## **(2) Submitting the Application**

**(a) For Electronic Submission** – Application forms and instructions are available at Grants.gov. To access these materials, go to <http://www.grants.gov>, select “Apply for Grants”, and then follow the instructions. In the Grants.gov search function, enter the funding opportunity number for this announcement ( BAA AFOSR 2011-06). You can also search for the CFDA Number 12.800, Air Force Defense Research Sciences Program. On the Selected Grant Applications for Download page, click on 'download' under the heading 'Instructions and Applications' to download the application package.

Note: All attachments to all forms must be submitted in PDF format (Adobe Portable Document Format). Grants.gov provides links to PDF file converters at this site: <http://grants.gov/agencies/asoftware.jsp#3>.

**(b) For Hard Copy Submission** – For hard copy submission, the original proposal and copies must be delivered to the attention of the program manager at the Air Force Office of Scientific Research at the following address:

AFOSR (Attn: Name of Program Manager)  
Air Force Office of Scientific Research  
875 North Randolph Street, Room 3112  
Arlington VA 22203

In case of difficulties in determining the appropriate AFOSR addressee, proposals may be submitted to:

AFOSR/PKC  
875 Randolph Street, Room 3112  
Arlington VA 22203-1954

(c) SF 424 Research and Related (R&R) - The SF 424 (R&R) form must be used as the cover page for all electronic and hard copy proposals. No other sheets of paper may precede the SF 424 (R&R) for a hard copy proposal. A signed copy of the SF 424 (R&R) should be submitted with all hardcopy proposals. Complete all the required fields in accordance with the “pop-up” instructions on the form and the following instructions for the specified fields. To see the instructions, roll your mouse over the field to be filled out. You will see additional information about that field. For example on the SF424 (R&R) the Phone Number field says 'PHONE NUMBER (Contact Person): Enter the daytime phone number for the person to contact on matters relating to this application. This field is required.' Mandatory fields will have an asterisk marking the field and will appear yellow on most computers. In grants.gov, some fields will self populate based on the BAA selected. Please fill out the SF 424 first, as some fields on

the SF 424 are used to auto populate fields in other forms. The completion of most fields is self-explanatory except for the following special instructions:

- Field 2: The Applicant Identifier may be left blank.
- Field 3: The Date Received by State and the State Application Identified are not applicable to research.
- Field 7: Complete as indicated. If Small Business is selected, please note if the organization is Woman-owned and/or Socially and Economically Disadvantaged. If the organization is a Minority Institution, select "Other" and under "Other (Specify)" note that you are a Minority Institution (MI).
- Field 9: List Air Force Office of Scientific Research as the reviewing agency. This field is pre-populated in grants.gov.
- Field 17: Choose 'No'. Check 'Program is Not Covered By Executive Order 12372'.
- Attachments: All attachments to all Grants.gov forms must be submitted in PDF format (Adobe Portable Document Format). To convert attachments into PDF format, Grants.gov provides a list of PDF file converters at [http://www.grants.gov/resources/download\\_software.jsp](http://www.grants.gov/resources/download_software.jsp)

A signed copy of the SF 424 (R&R) should be submitted with all hardcopy proposals.

(d) Certification: All awards require some form of certifications of compliance with national policy requirements. For assistance awards, i.e., grants and cooperative agreements, proposers using the SF 424 (R&R) are providing the certification required by 32 CFR Part 28 regarding lobbying. (The full text of this certification may be found at <http://www.wpafb.af.mil/shared/media/document/AFD-070817-127.pdf>). If you have lobbying activities to disclose, you must complete the optional form SF-LLL, Standard Form – LLL, 'Disclosure of Lobbying Activities' in the downloaded Adobe forms package.

If it is determined a contract is the appropriate vehicle, AFOSR will request additional documentation from prospective awardees. For contract awards, prospective contractors shall complete electronic annual representations and certifications at <http://www.bpn.gov/orca>. The representations and certifications shall be submitted to ORCA as necessary, but updated at least annually, to ensure they are current, accurate, and complete. These representations and certifications are effective until one year from date of submission or update to ORCA. In addition to the ORCA representations and certifications, prospective contractors shall complete the AFOSR Contract Certification which can be located at <http://www.wpafb.af.mil/shared/media/document/AFD-070820-024.doc>.

(e) Research and Related (R&R) Other Forms: The following other forms must be used for all electronic and hard copy proposals: R&R Senior/Key Person Profile form, R&R Project/Performance Site Locations form, R&R Other Project Information form and the R&R Budget form. The R&R Subaward Budget Attachment Forms is required when subawardees are involved in the effort. The SF-LLL form is required when applicants have lobbying activities to disclose. PDF copies of all forms may be obtained at the grants.gov website.

(f) R&R Senior/Key Person Profile Form – Complete the R&R Senior/Key Person Profile Form for those key persons who will be performing the research. Information about an individual is subject to the requirements of the Privacy Act of 1974 (Public Law 93 579). The information is requested under the authority of Title 10 USC, Sections 2358 and 8013. The principal purpose

and routine use of the requested information are for evaluation of the qualifications of those persons who will perform the proposed research. Failure to provide such information will delay award. For the principal investigator and each of the senior staff, provide a short biographical sketch and a list of significant publications (vitae) and attach it to the R&R Senior/Key Person Profile Form.

(g) R&R Project/Performance Site Locations Form – Complete all information as requested.

(h) R&R Other Project Information Form - Human Subject/Animal Use and Environmental Compliance.

**Human Subject Use.** Each proposal must address human subject involvement in the research by addressing Field 1 and 1a of the R&R Other Project Information Form. If Field 1 indicates “Yes”, the Air Force must receive a completed OMB No. 0990-0263 form before a contract, grant, or cooperative agreement may be awarded to support research involving the use of human subjects. Attach the document to the R&R Other Project Information Form. If using grants.gov, a completed OMB No. 0990-0263 form shall be attached in field 11 of the R&R Other Project Information Form. The OMB No. 0990-0263 is available electronically at:

<http://apply.grants.gov/apply/forms/sample/ProtectionofHumanSubjects-V1.1.pdf> Refer any questions regarding human subjects to the AFOSR Directorate of Aerospace, Chemical and Materials Sciences at (703) 696-8483.

**Animal Use.** Each proposal must address animal use protocols by addressing Field 2 and 2a of the R&R Other Project Information Form. If selected for award, additional documentation in accordance with Air Force standards will be required. Refer any questions regarding animal subjects to the AFOSR Directorate of Aerospace, Chemical and Materials Sciences at (703) 696-8483.

**Environmental Compliance.** Federal agencies making contract, grant, or cooperative agreement awards and recipients of such awards must comply with various environmental requirements. The National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. Sections 4321-4370 (a), requires that agencies consider the environmental impact of “major Federal actions” prior to any final agency decision. With respect to those awards which constitute “major Federal actions,” as defined in 40 CFR 1508.18, federal agencies may be required to comply with NEPA and prepare an environmental impact statement (EIS) even if the agency does no more than provide grant funds to the recipient. Questions regarding NEPA compliance should be referred to the AFOSR legal staff at (703) 696-9705. Most research efforts funded by AFOSR will, however, qualify for a categorical exclusion from the need to prepare an EIS. Air Force instructions/regulations provide for a categorical exclusion for basic and applied scientific research usually confined to the laboratory, if the research complies with all other applicable safety, environmental and natural resource conservation laws. Each proposal shall address environmental impact by filling in fields 4a through 4d of the R&R Other Project Information Form. This information will be used by AFOSR to make a determination if the proposed research effort qualifies for categorical exclusion.

**Abstract** - Include a concise (not to exceed 300 words) abstract that describes the research objective, technical approaches, anticipated outcome and impact of the specific research. In the

header of the abstract include the program manager's name and directorate who should receive the proposal for consideration and evaluation. Attach the Abstract to the R&R Other Project Information form in field 6.

(i) R&R Other Project Information Form - Project Narrative Instructions

**Project Narrative – Describe clearly the research including the objective and approach to be performed keeping in mind the evaluation criteria listed in Section V of this announcement. Also briefly indicate whether the intended research will result in environmental impacts outside the laboratory, and how the proposer will ensure compliance with environmental statutes and regulations. Attach the proposal narrative to R&R Other Project Information form in field 7.**

**Project Narrative - Statement of Objectives – Describe the actual research to be completed, including goals and objectives, on one-page titled Statement of Objectives. This statement of objectives may be incorporated into the award instead of incorporating the entire technical proposal. Active verbs should be used in this statement (for example, “conduct” research into a topic, “investigate” a problem, “determine” to test a hypothesis). It should not contain proprietary information.**

**Project Narrative - Research Effort – Describe in detail the research to be performed. State the objectives and approach and their relationship and comparable objectives in progress elsewhere. Additionally, state knowledge in the field and include a bibliography and a list of literature citations. Discuss the nature of the expected results. The adequacy of this information will influence the overall evaluation. Proposals for renewal of existing support must include a description of progress if the proposed objectives are related.**

**Project Narrative – Principal Investigator (PI) Time. PI time is required. List the estimate of time the principal investigator and other senior professional personnel will devote to the research. This shall include information pertaining to other commitments of time, such as sabbatical or extended leave; and proportion of time to be devoted to this research and to other research. Awards may be terminated when the principal investigator severs connections with the organization or is unable to continue active participation in the research. State the number of graduate students for whom each senior staff member is responsible. If the principal investigator or other key personnel are currently engaged in research under other auspices, or expect to receive support from other agencies for research during the time proposed for AFOSR support, state the title of the other research, the proportion of time to be devoted to it, the amount of support, name of agency, dates, etc. Send any changes in this information as soon as they are known. Submit a short abstract (including title, objectives, and approach) of that research and a copy of the budget for both present and pending research projects.**

**Project Narrative – Facilities. Describe facilities available for performing the proposed research and any additional facilities or equipment the organization proposes to acquire at its own expense. Indicate government-owned facilities or equipment already possessed that will be used. Reference the facilities contract number or, in the absence of a facilities contract, the specific facilities or equipment and the number of the award under which they are accountable.**

**Project Narrative – Special Test Equipment. List special test equipment or other property required to perform the proposed research. Segregate items to be acquired with award funds from those to be furnished by the Government. When possible and practicable, give a description or title and estimated cost of each item. When information on individual items is unknown or not available, group the items by class and estimate the values. In addition, state why it is necessary to acquire the property with award funds.**

Project Narrative – Equipment. Justify the need for each equipment item. Additional facilities and equipment will not be provided unless the research cannot be completed by any other practical means. Include the proposed life expectancy of the equipment and whether it will be integrated with a larger assemblage of apparatus. If so, state who owns the existing apparatus. Project Narrative – High Performance Computing Availability. Researchers that are supported under an AFOSR grant or contract, and meet certain restrictions, are eligible to apply for special accounts and participation in a full-spectrum of activities within the DOD high performance computing modernization program. This program provides, at no cost to the user, access to a range of state-of-the-art high performance computing assets and training opportunities that will allow the user to fully exploit these assets. Details of the capabilities of the program can be found at the following Internet address: <http://www.hpcmo.hpc.mil>. Researchers needing high performance cycles should address the utilization of this program to meet their required needs. AFOSR program managers will facilitate the establishment of accounts awarded.

(j) R&R Budget Form - Estimate the total research project cost. Categorize funds by year and provide separate annual budgets for projects lasting more than one year. In addition to the Research & Related Budget forms available on Grants.gov, the budget proposal should include a budget justification for each year, clearly explaining the need for each item. Applicants who enter a fee on Part J of the budget will not be eligible to receive a grant or cooperative agreement. Should a grant be awarded AFOSR will make payments to educational and non-profit recipients based upon a predetermined payment schedule. Payments will normally be made quarterly in advance of performance, based upon a spending profile which must be provided as part of the proposal. Payments should be limited to the amounts needed to conduct research during each respective period. Educational and Non-profit organizations shall submit a spending profile with their cost proposal. Attach the budget justification and/or spending profile to Section K of the R&R Budget form.  
(<http://www.wpafb.af.mil/library/factsheets/factsheet.asp?id=9388>).

#### **4. Other Submission Requirements**

Proposals submitted in whole or in part by electronic media (computer disk or tape, facsimile machine, electronic mail, etc.) will not be accepted (unless the full proposal is submitted electronically through Grants.gov).

#### **5. Application Receipt Notices.**

**a. For Electronic Submission** - The applicant's approved account holder for grants.gov will receive a confirmation page upon completing the submission to Grants.gov. This confirmation page is a record of the time and date stamp that is used to determine whether the proposal was submitted by the deadline. A proposal received after the deadline is "late" and will not be considered for an award. After an institution submits an application, Grants.gov generates a submission receipt via email and also sets the application status to "Received". This receipt verifies the Application has been successfully delivered to the Grants.gov system. Next, Grants.gov verifies the submission is valid by ensuring it does not contain viruses, the opportunity is still open, and the applicant login and applicant DUNS number match. If the submission is valid, Grants.gov generates a submission validation receipt via email and sets the

application status to “Validated”. If the application is not validated, the application status is set to "Rejected". The system sends a rejection email notification to the institution and the institution must resubmit the application package. Applicants can track the status of their application by logging in to Grants.gov.

**b. For Hard Copy Submission** – An applicant that submits a hard copy proposal to AFOSR will receive an email from the agency approximately ten days after the proposal due date to acknowledge receipt of the proposal and provide the agency’s assigned tracking number. The email is sent to the authorized representative for the applicant institution. A hard copy proposal received at an agency’s listed mailing address after the deadline, if one is specifically listed in the announcement, is “late” and will not be considered for an award, except for cases in which there is acceptable evidence to establish that the proposal:

- a. Was delivered to the agency and was under the agency’s control prior to the deadline: or
- b. Was sent to the agency’s listed mailing address by the U.S. Postal Service Express Mail three or more business days prior to the date specified for the receipt of the proposals. The term “business days” excludes weekends and U.S. federal holidays.

6. Submission Dates and Times. Proposals must be submitted by 3:00 P.M. Eastern Time, 31 August 2011.

## **V. Application Review Information**

AFOSR’s overriding purpose in supporting this research is to advance the state of the art in areas related to the technical problems the Air Force encounters in developing and maintaining a superior Air Force; lowering the cost and improving the performance, maintainability, and supportability of Air Force weapon systems; and creating and preventing technological surprise.

Proposals submitted under this BAA are evaluated through a peer or scientific review process, and selected for award on a competitive basis according to Public Law 98-369, Competition in Contracting Act of 1984, 10 USC 2361, and 10 USC 2374. Proposals may be evaluated by program managers at EOARD/AOARD and the appropriate AFRL Technology Directorates. Additionally, proposals may be evaluated by outside evaluators retained by AFOSR which may include support contractor personnel. Proposals submitted for Special Programs listed in Section I shall be evaluated under criteria as specified in their description. Subject to funding availability, all other proposals will be evaluated under the following two primary criteria, of equal importance, as follows:

- 1. The scientific and technical merits of the proposed research.
- 2. The potential contributions of the proposed research to the mission of the USAF.

Other evaluation criteria used in the technical reviews, which are of lesser importance than the primary criteria and of equal importance to each other, are:

1. The likelihood of the proposed effort to develop new research capabilities and to broaden the university research base in support of national defense, and the potential to contribute to the education of future scientists and engineers in disciplines critical to the mission of the USAF.
2. The proposer's, principal investigator's, team leader's, or key personnel's qualifications, capabilities, related experience, facilities, or techniques or a combination of these factors that are integral to achieving USAF objectives.
3. The proposed involvement and interaction with DoD or other federal laboratories, industry or other existing research centers of excellence.
4. The realism and reasonableness of proposed costs.

No further evaluation criteria will be used in source selection. The technical and cost information will be analyzed simultaneously during the evaluation process.

Technology sharing and transfer is encouraged; in this respect, AFOSR welcomes proposals that envision university-industry cooperation. Non-industry proposers are encouraged to specify in their technical proposals their interactions with industry and the Air Force Research Laboratory's Technical Directorates, including specific points of contact. Cooperation with or use of facilities of the Air Force Research Laboratory is also encouraged. Personnel interaction (e.g., university faculty or students performing research at industry or Air Force Research Laboratory sites; industry or Air Force staff working in university laboratories) is viewed as highly desirable. Further information regarding the Air Force Research Laboratory may be viewed at <http://www.afrl.af.mil>.

## **VI. Award Administration Information**

### **1. Award Notices.**

Should your proposal be selected for award, the principal investigator will receive a letter from the Technical Directorate stating this information. This is not an authorization to begin work. Your business office will be contacted by the grant or contracting officer to negotiate the terms of your award.

### **2. Reporting Requirements.**

Grants and cooperative agreements typically require annual and final technical reports, financial reports, and final patent reports. Contracts typically require annual and final technical and patent reports. Copies of publications and presentations should be submitted.

Additional deliverables may be required based on the research being conducted.

## **VII. Agency Contacts**

Should you have questions about a technical research area, contact the program manager listed for the research topic areas listed in Section I. Should you have questions about the BAA or procedures for submission of a proposal, contact Ricky Christie at (703) 696-9728 or [ricky.christie@afosr.af.mil](mailto:ricky.christie@afosr.af.mil).

## **VIII. Additional Information**

1. The cost of proposal preparation in response to this Announcement is not considered an allowable direct charge to any resulting award. Such cost is, however, an allowable expense to the normal bid and proposal indirect cost specified in FAR 31.205-18, or OMB Circular A-21, Cost Principles for Educational Institutions or OMB Circular A-122, Cost Principles for Nonprofit Organizations.
2. Every effort will be made to protect the confidentiality of the proposal and any evaluations. The proposer must mark the proposal with a protective legend in accordance with FAR part 15.6, Use and Disclosure of Data, if protection is desired for proprietary or confidential information.
3. Only contracting or grants officers are legally authorized to bind the government.
4. Intellectual Property
  - a. Proposers shall identify all aspects of the intellectual property; technical data, hardware, and software that they plan to develop under this award for which the Government will acquire less than unlimited rights and to list specifically what the restrictions are. In the event that proposers do not submit such a list, the Government will assume that it automatically has unlimited rights to all intellectual property, technical data, hardware, and software developed under this award. Furthermore, the Government will assume that it has unlimited rights to all intellectual property, technical data, hardware, and software developed under this award that is not listed.
  - b. Proposers are advised that proposals containing restrictions on intellectual property are by nature less favorable and valuable to the government. Restrictions will be considered in the evaluation process. If no restrictions are intended, then the proposer should state this fact.
5. AFOSR documents are available on the AFOSR website at <http://www.wpafb.af.mil/AFRL/afosr/>.
6. Responses should reference Broad Agency Announcement BAA AFOSR 2011-06.
7. Prospective awardee shall be registered in the CCR database prior to award, during performance, and through final payment of any award resulting from this announcement. Offerors may obtain information on registration and annual confirmation requirements via the Internet at <http://www.ccr.gov> or by calling 1-888-227-2423, or 269-961-5757.